

**Differences in physical characteristics and performance measures of PT and FT tactical personnel: A critical narrative review**

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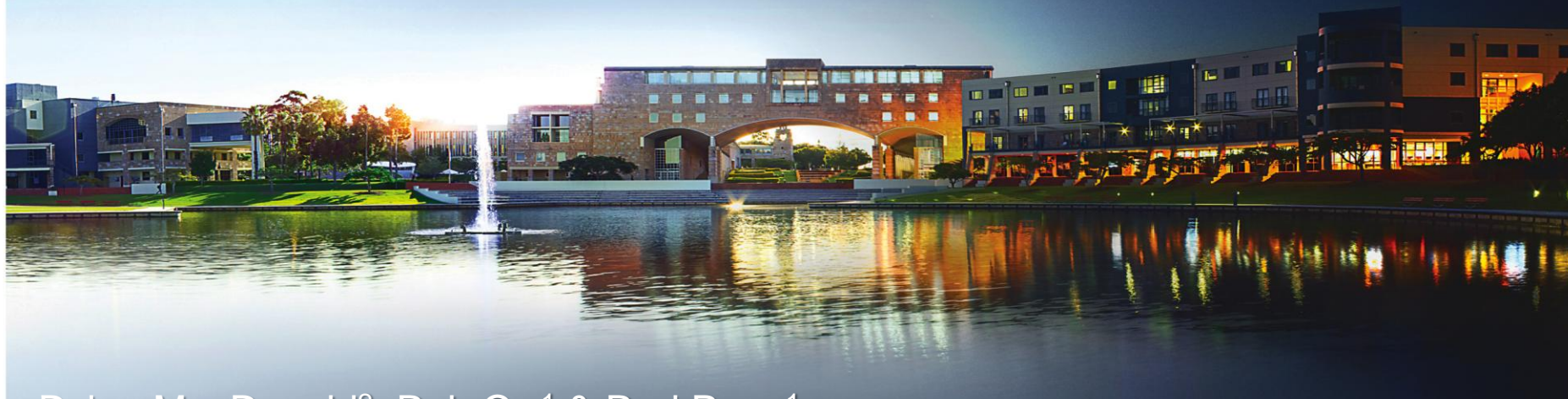
MacDonald, D., Orr, R. M., & Pope, R. R. (2015). *Differences in physical characteristics and performance measures of PT and FT tactical personnel: A critical narrative review*. Australasian Military Medicine Association (AMMA) Conference 2015 , Hobart, Tasmania, Australia.

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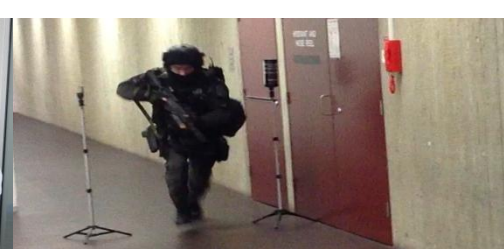
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# Differences in physical characteristics and performance measures of PT and FT tactical personnel: A critical narrative review



Dylan MacDonald<sup>2</sup>, Rob Orr<sup>1</sup> & Rod Pope<sup>1</sup>

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# Background

- Tactical personnel (i.e. military, law enforcement and fire and rescue personnel) routinely perform physically strenuous occupational tasks, requiring muscular strength, endurance and cardiovascular fitness

<http://www.australianpolice.com.au/wp-content/uploads/2012/10/spg1-219x200.jpg>

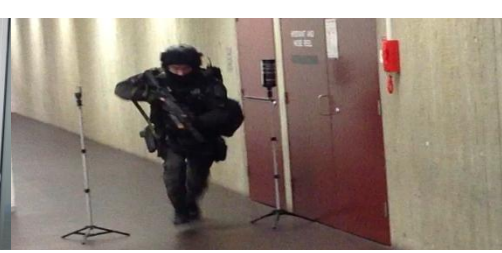
<http://www.northernlife.ca/news/localNews/2011/06/14-mine-rescue-competition-sudbury.aspx>

<http://s142.photobucket.com/user/DragonSilverFlames/media/FireFighters.jpg.html>

1 JPAU







# Background

- These services are comprised of both PT and FT personnel, with both groups expected to perform similar occupational tasks, at equivalent levels

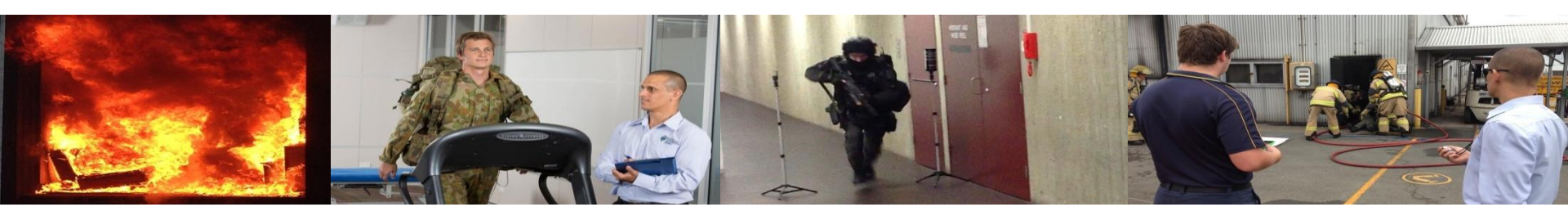


(Lindberg, 2014; Williams, 2005)



# Background

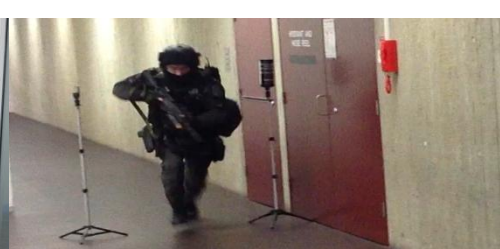
- PT personnel on-the-job physical training typically continues to be at a lower frequency than that of FT personnel  
(Pickup, 2009; Williams & Evans, 2007; Williams; 2005)
- PT personnel often have to balance other occupations and work demands with their tactical role, and so frequently have to be responsible for their own physical training sessions  
(Pickup, 2009; Williams & Evans, 2007)



# Aim of the Review

- ...to critically appraise and discuss the findings of existing research that has compared the physical characteristics and physical performance capacities of PT and FT tactical personnel

*This research was supported by a grant from the Defence Health Foundation*



# Methods

1. Literature databases searched : PubMed, CINAHL, EBSCO, and Web of Science were searched using key search terms.

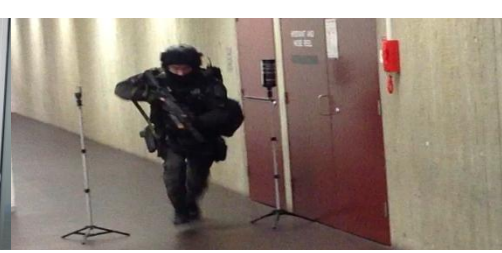
**PubMed**

("full-time" OR "part-time" OR "reserve") AND ("home guard" OR "army" OR "defence" OR "defense" OR "police" OR "military" OR "soldiers" OR "firefighters" OR "first responder")

**CINAHL**

("full-time" OR "part-time" OR "reserve") AND ("home guard" OR "army" OR "defence" OR "defense" OR "police" OR "military" OR "soldiers" OR "firefighters" OR "first responder")

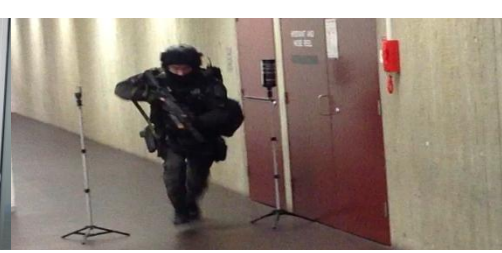




# Methods

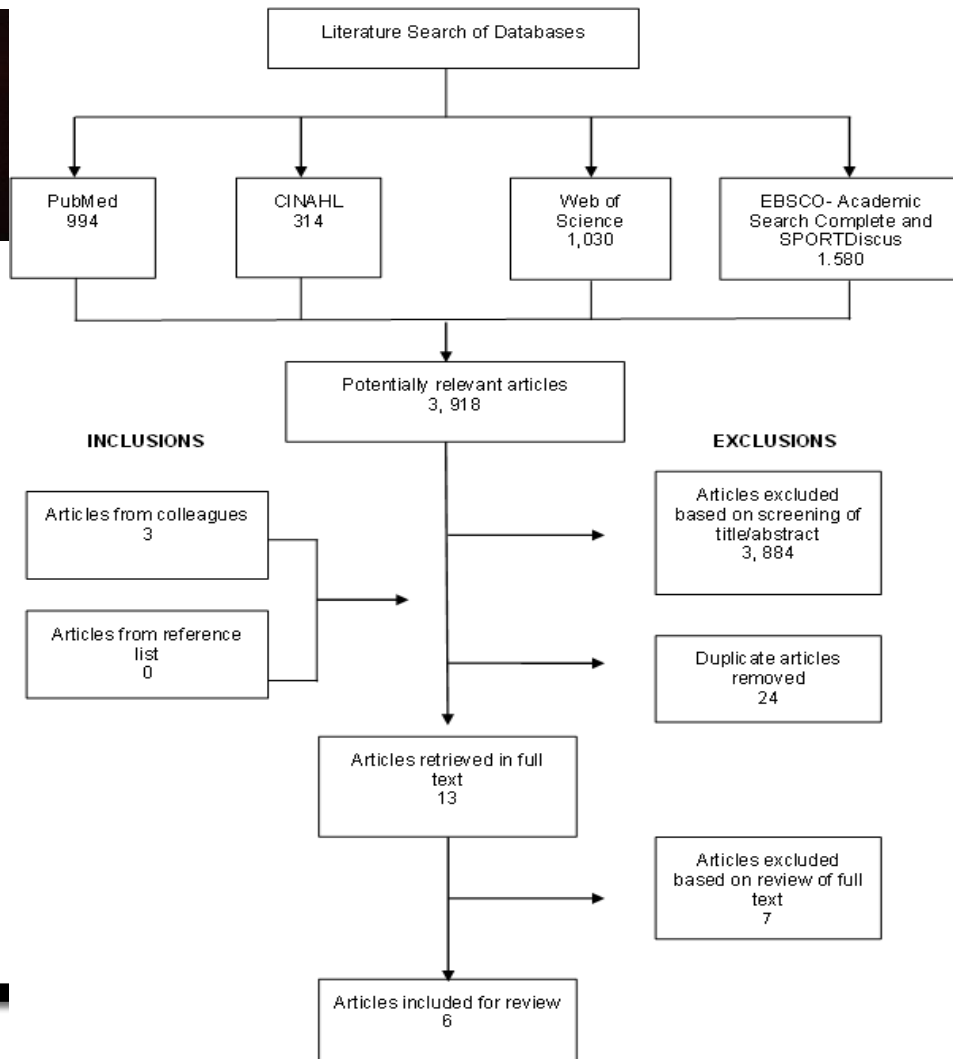
2. Reference lists of included articles were manually searched, and
3. Colleagues with expertise in the topic area were asked to identify any additional articles of relevance.

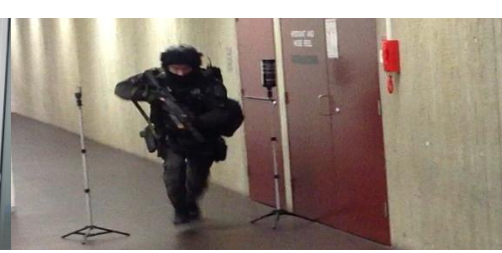




# Methods

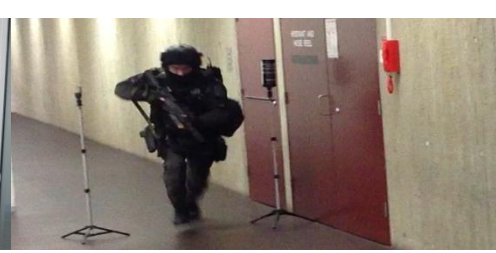
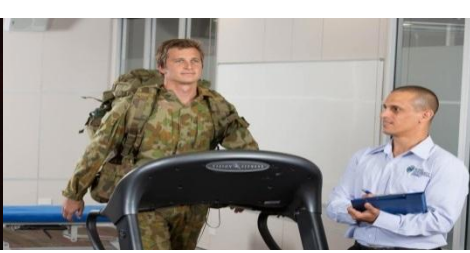
- The inclusion criteria were:
  - (a) the study was published in the English language;
  - (b) the study involved human participants;
  - (c) the study was published in 1994 or later;
  - (d) the study involved participants from tactical populations
  - (e) the study included both part-time and full-time participants
- The exclusion criterion was any study that did not examine anthropometric or physical performance measure(s)





# Methods

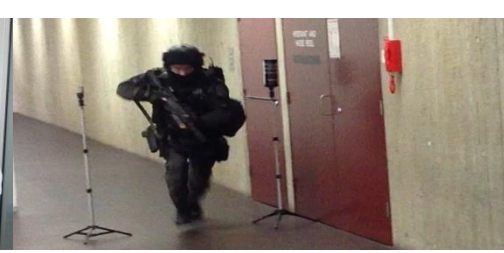
- Included articles were critically appraised using the Downs and Black checklist (Downs & Black, 1998)
- Cohen's Kappa Analysis of all raw scores (28 item scores per paper)
- Graded according to Kennelly (Kennelly, 2011)



# Results

- Six articles
  - Downs and Black scores ranged from 57% to 61%
  - *fair quality*
  - The kappa statistic for inter-rater agreement indicated an '*almost perfect*' agreement ( $k=0.923$ )





# Results

- Participants included

- Male only personnel

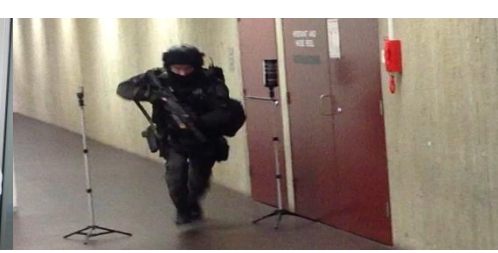
(Dawes et al., 2013; Williams & Evans, 2007; Williams, 2005)

- Male and female personnel

(Lindberg, Malm et al., 2014; Wynn & Hawdon, 2012)

- Male tactical personnel and both male and female civilians

(Lindberg, Oska et al., 2014)



# Results

- The tactical personnel investigated in the studies were:

- military

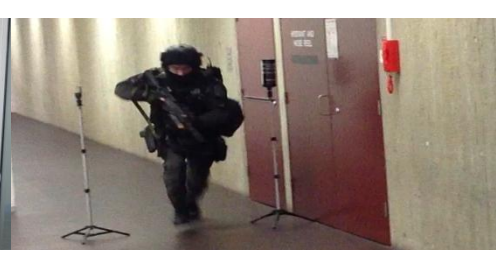
(Williams & Evans, 2007; Williams, 2005)

- law enforcement (SWAT)

(Dawes et al., 2013)

- firefighter

(Lindberg, Malm et al., 2014; Lindberg, Oska et al., 2014; Wynn & Hawdon, 2012)



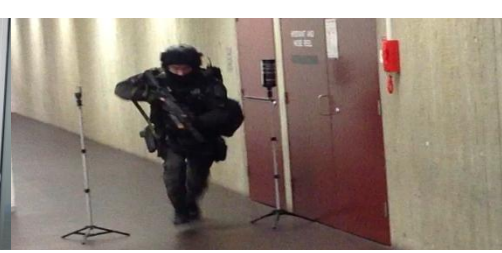
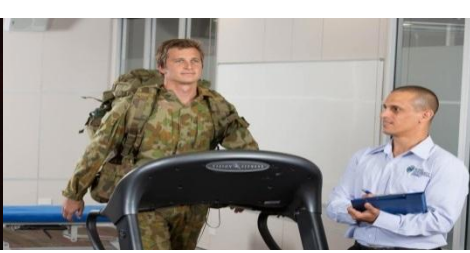
# Results

- Physical characteristics were measured using:
  - Anthropometry or body composition (Dawes et al., 2013; Williams & Evans, 2007; Williams, 2005)

<http://www.army.gov.au/~media/Images/Army%20Life/ARTC/Images/Fitness%20preparation%20460X306.ashx?h=306&w=460>



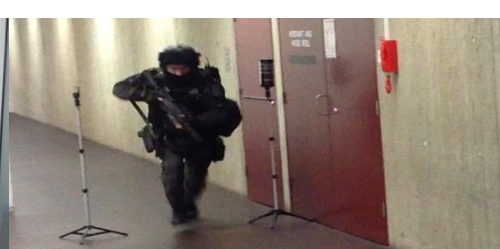
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# Results

- Physical performance capacity was measured in terms of:
  - muscular endurance (Dawes et al., 2013)
  - lower-body power (Dawes et al., 2013)
  - anaerobic endurance (Dawes et al., 2013)
  - aerobic fitness (Lindberg, Malm et al., 2014; Wynn & Hawdon, 2012; Williams & Evans, 2007; Williams, 2005)
  - physical work capacity or work levels (Lindberg, Oska et al., 2014; Williams & Evans, 2007)





# Results – Body Composition

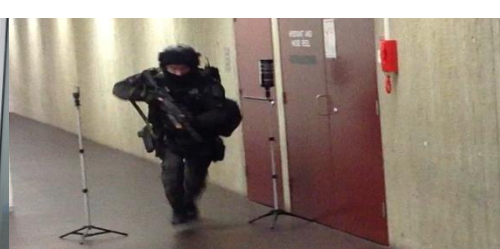
- PT

- mean BMI ranged from  $23.5 \pm 4.4$  to  $30.1 \pm 3.2$  kg/m<sup>2</sup>
- mean BF% ranged from  $14.0 \pm 4.4$  to  $20.4 \pm 3.5\%$

- FT

- mean BMI ranged from  $22.0 \pm 2.1$  to  $26.3 \pm 2.3$  kg/m<sup>2</sup>
- mean BF% ranged from  $10.7 \pm 2.6$  to  $18.9 \pm 4.0\%$

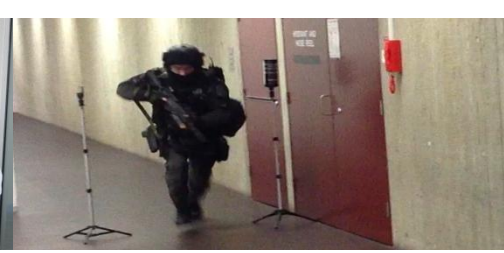
(Dawes et al., 2013; Williams & Evans, 2007; Williams, 2005)



# Results – Cardiovascular Fitness

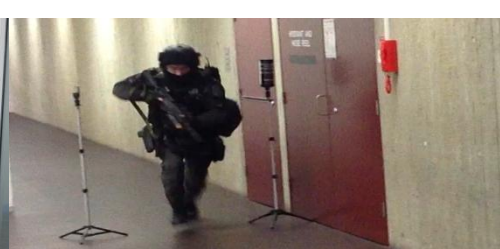
- PT
  - mean  $\text{VO}_{2\text{max}}$  ranged from  $40.9 \pm 6.1$  to  $47.69 \pm 7.64$  mL/kg/min
- FT
  - mean  $\text{VO}_{2\text{max}}$  ranged from  $44.8 \pm 4.9$  to  $50.10 \pm 7.05$  mL/kg/min

(Lindberg, Malm et al., 2014; Wynn & Hawdon, 2012; Williams & Evans, 2007; Williams, 2005)



# Results – Cardiovascular Fitness

- *Of note:*
  - *part-time firefighters and home guard personnel found to have an estimated  $VO_{2max}$  of 50.1 and 53.0 mL/kg/min (Aandstad et al., 2014; von Heimburg et al., 2006)*



# Results – Musculoskeletal Fitness

- PT SWAT:

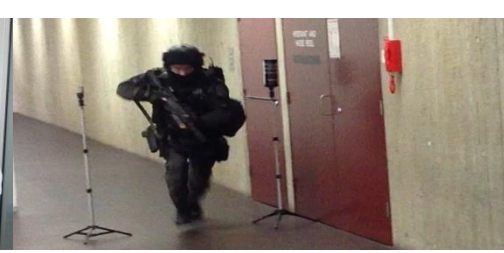
- VJ  $55.40 \pm 6.65$  cm, Sit Ups  $56.52 \pm 12.89$ , Push Ups  $64.52 \pm 14.05$

- FT SWAT:

- VJ  $68.94 \pm 9.55$  cm, Sit Ups  $82.70 \pm 8.52$ , Push Ups,  $89.46 \pm 12.95$

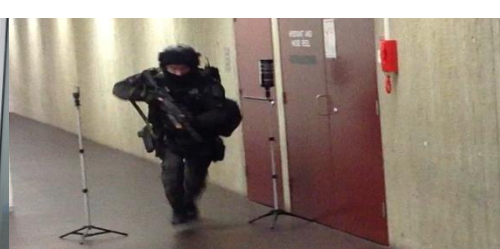
(Dawes et al., 2013)





## Results – Task Performance

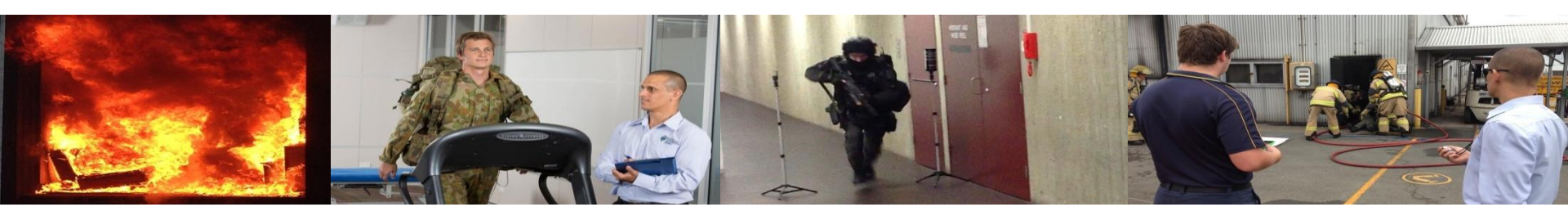
- Williams & Evans, 2007: No statistically significant differences between PT & FT soldiers for any variables assessed inc: Lift and Carry tasks.
- Lindberg, Oska et al., 2014: No overall statistically significant differences observed between PT & FT firefighters
  - Seven simulated firefighting work tasks
    - However found sig differences in task effort ratings (Lindberg, Malm et al., 2014)



# Conclusions

- The available evidence re: PT & FT is of moderate methodological quality

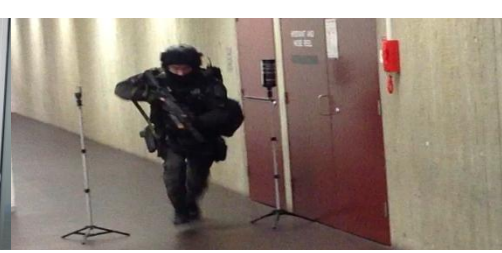




# Conclusions

- Generally, the research indicates that PT personnel exhibit higher BMI and BF% and lower levels of aerobic capacity and strength than FT personnel
- However, findings were variable and may reflect variation across populations in different PT & FT personnel - regular work frequencies and intensities, and individually and institutionally-arranged physical training regimes



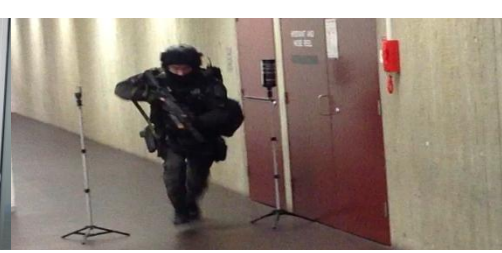


# Acknowledgement

- The Defence Health Foundation

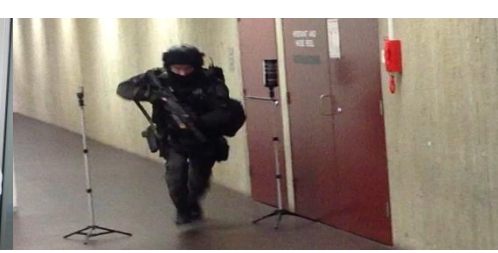






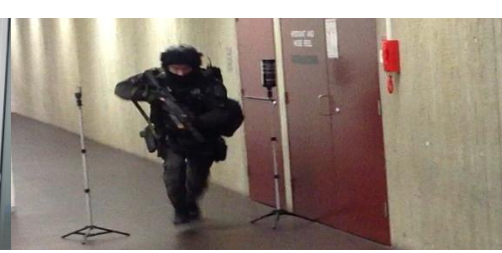
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